Applied A.I. Solutions

Data Visualization Techniques

Professor

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DATA VISUALIZATION TECHNIQUES

Advanced Data Visualizations using Tableau

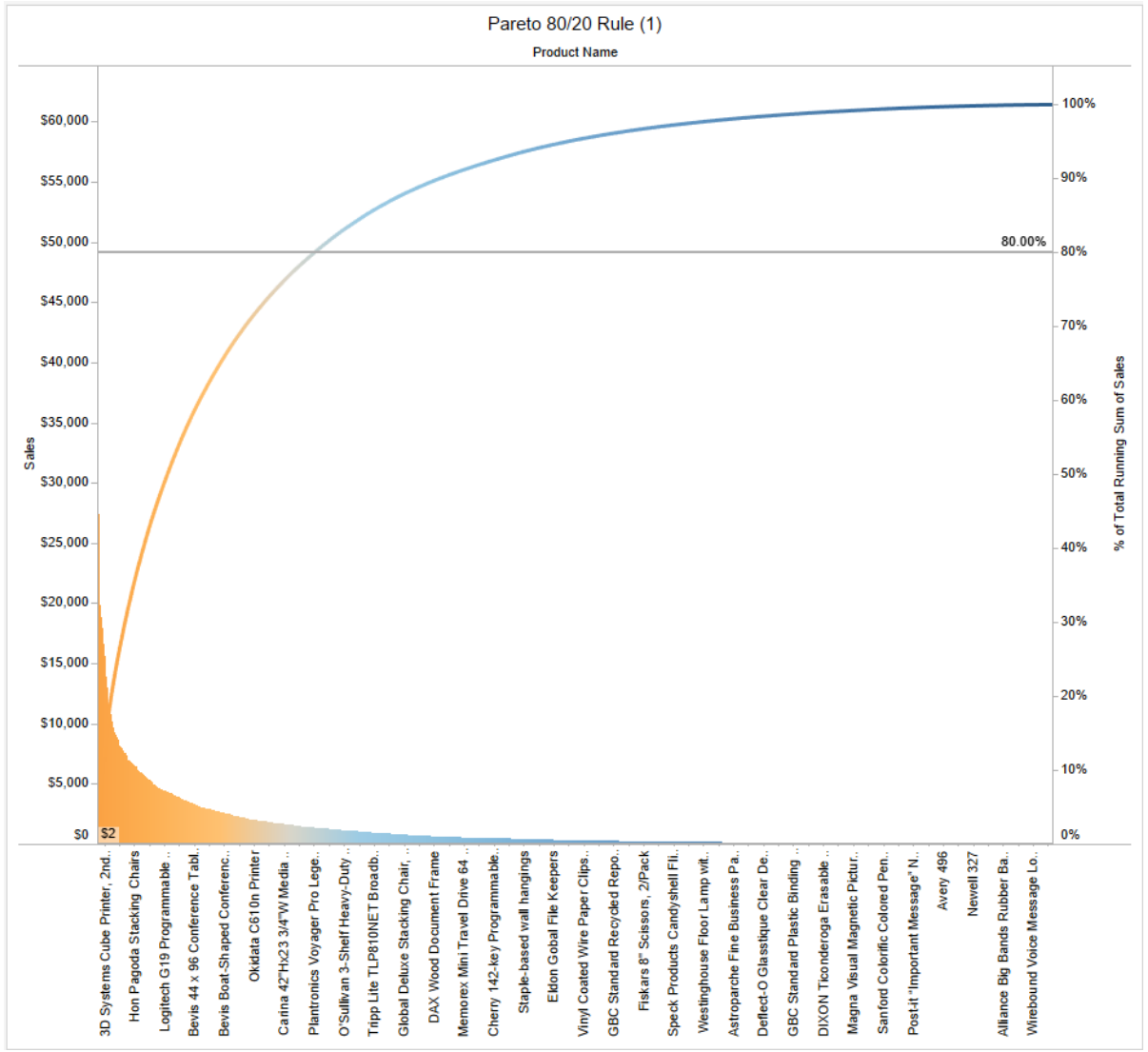
- Pareto Principle
- Clustering
- Root Cause Analysis (What-if)

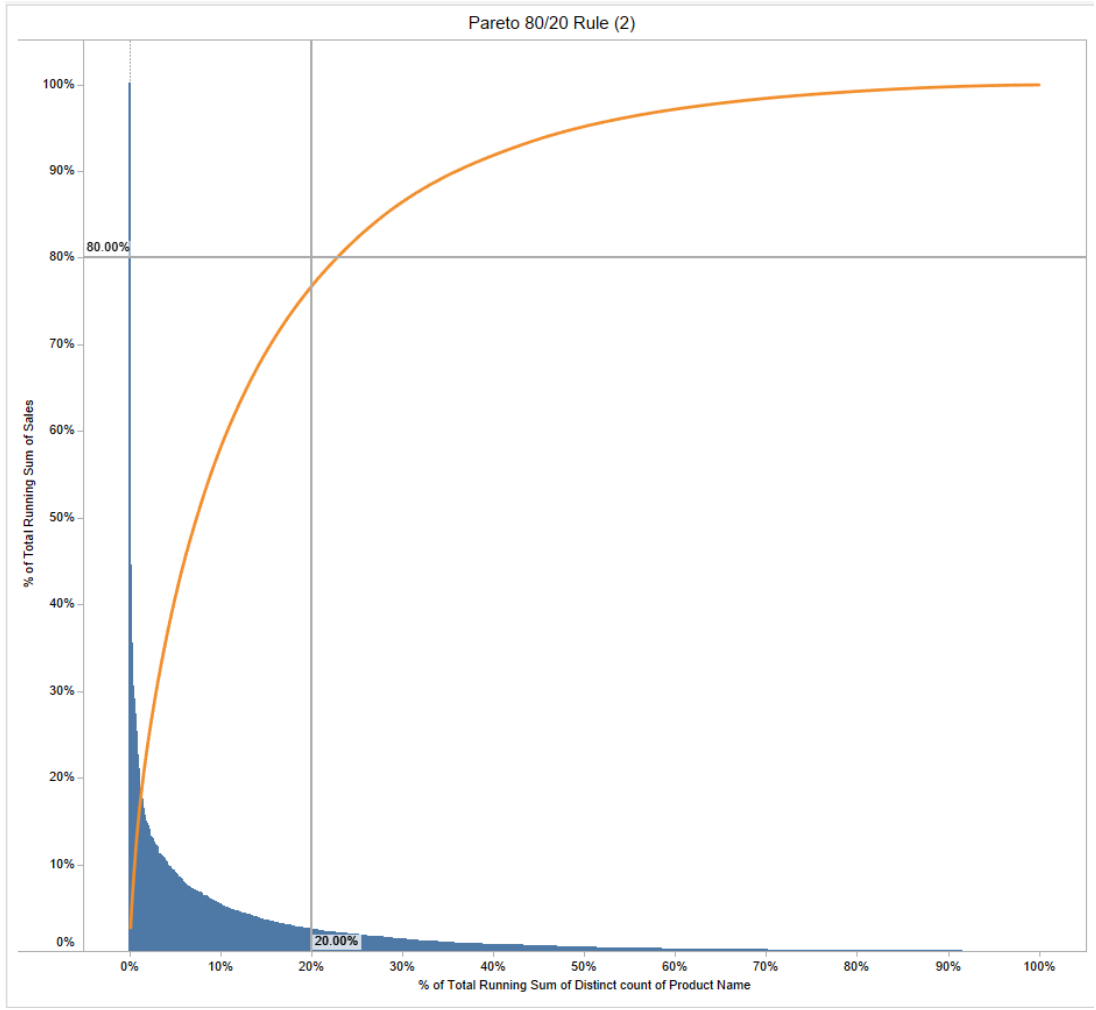
1 – Pareto Principle

- The Pareto principle (also known as the 80/20 rule, the law of the **vital few)**, or the principle of factor sparsity, states that, for many events, roughly 80% of the effects come from 20% of the causes.

- Management consultant Joseph M. Juran suggested the principle and named it after Italian economist Vilfredo Pareto.

- 20% of products represents 80% sales. What data would I need to verify the hypothesis?


Pareto 80/20 Rule (1)
Product Name
Sales
% of Total Running Sum of Sales
$60,000
$55,000
$50,000
$45,000
$40,000
$35,000
$30,000
$25,000
$20,000
$15,000
$10,000
$5,000
$0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
80.00%
$2
3D Systems Cube Printer, 2nd..
Hon Pagoda Stacking Chairs
Logitech G19 Programmable ..
Bevis 44 x 96 Conference Tabl..
Bevis Boat-Shaped Conferenc..
Okidata C610n Printer
Carina 42"Hx23 3/4"W Media ..
Plantronics Voyager Pro Lege..
O'Sullivan 3-Shelf Heavy-Duty ..
Tripp Lite TLP810NET Broadb..
Global Deluxe Stacking Chair, ..
DAX Wood Document Frame
Memorex Mini Travel Drive 64 ..
Cherry 142-key Programmable..
Staple-based wall hangings
Ekton Gobal File Keepers
Vinyl Coated Wire Paper Clips..
GBC Standard Recycled Repo..
Fiskars 8" Scissors, 2/Pack
Speck Products Candyshell Fli..
Westinghouse Floor Lamp wit..
Astroparche Fine Business Pa..
Deflect-O Glasstique Clear De..
GBC Standard Plastic Binding ..
DIXON Ticonderoga Erasable..
Magna Visual Magnetic Pictur..
Sanford Colorific Colored Pen..
Post-it "Important Message" N..
Avery 496
Nevell 327
Alliance Big Bands Rubber Ba..
Wirebound Voice Message Lo..

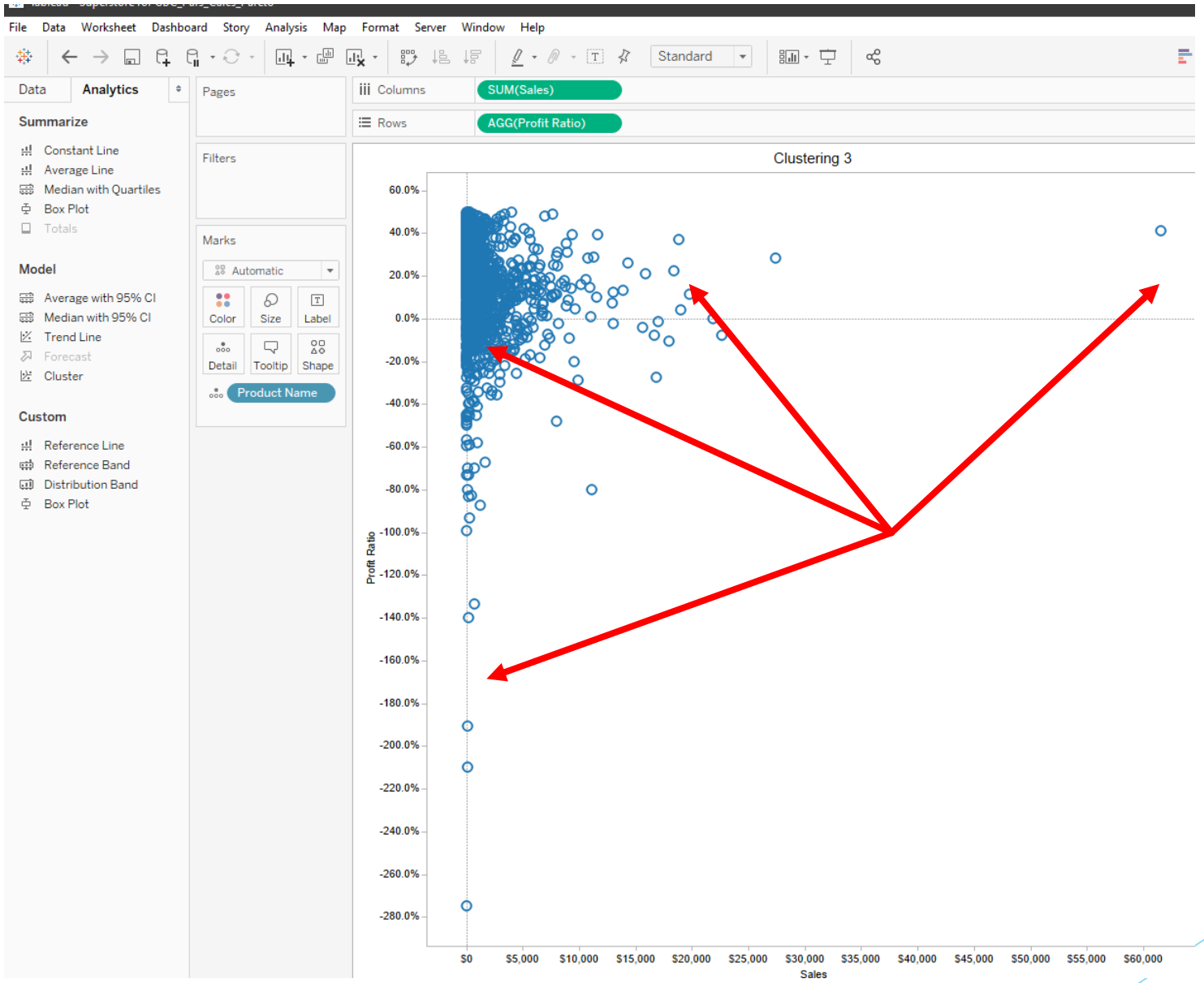

Pareto 80/20 Rule (2)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
80.00%
20.00%
% of Total Running Sum of Sales
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
% of Total Running Sum of Distinct count of Product Name

2 – Clustering + Data subsets

- Clustering is a powerful feature that allows you to easily group similar dimension members

- This type of clustering helps you create **statistically-based** segments which provide insight into how different groups are similar as well as how they are performing compared to each other

- Segmentation is a tactic for making analyses more powerful


File Data Worksheet Dashboard Story Analysis Map Format Server Window Help
Standard
Data
Analytics
Summarize
Constant Line
Average Line
Median with Quartiles
Box Plot
Totals
Model
Average with 95% CI
Median with 95% CI
Trend Line
Forecast
Cluster
Custom
Reference Line
Reference Band
Distribution Band
Box Plot
Pages
Filters
Marks
Automatic
Color
Size
Label
Detail
Tooltip
Shape
Product Name
Columns
SUM(Sales)
Rows
AGG(Profit Ratio)
Clustering 3
Profit Ratio
60.0%
40.0%
20.0%
0.0%
-20.0%
-40.0%
-60.0%
-80.0%
-100.0%
-120.0%
-140.0%
-160.0%
-180.0%
-200.0%
-220.0%
-240.0%
-260.0%
-280.0%
$0
$5,000
$10,000
$15,000
$20,000
$25,000
$30,000
$35,000
$40,000
$45,000
$50,000
$55,000
$60,000
Sales

3. Root Cause Analysis

- Root cause analysis (RCA) is the process of discovering the root causes of problems in order to identify appropriate solutions

- **Goals and benefits**
  1. discover the root cause of a problem or event
  2. understand how to fix, compensate, or learn from any underlying issues within the root cause
  3. apply lessons learned to systematically prevent future issues or to repeat successes

Root cause analysis - Core principles

- Focus on correcting and remedying root causes rather than just symptoms
- Don’t ignore the importance of treating symptoms for short term relief
- Realize there can be, and often are, multiple root causes
- Focus on **HOW and WHY** something happened, not WHO was responsible
- Be methodical and find concrete cause-effect evidence to back up root cause claims
- Provide enough context and information to inform a corrective course of action.

Root cause analysis - techniques and methods

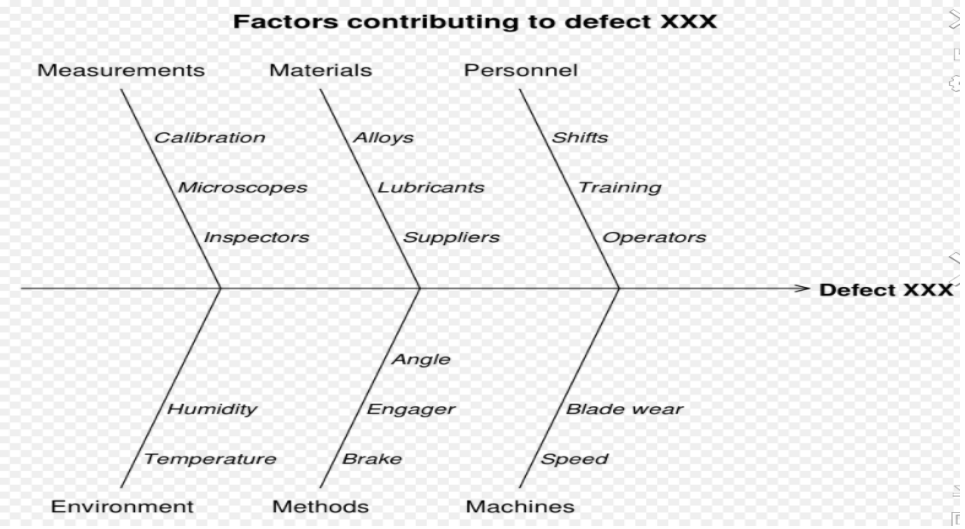
- **5 Whys approach**

  It is based on common wisdom, for every answer to a WHY question, an additional, deeper “Ok, but WHY?” question needs to be formulated

- **Change Analysis/Event Analysis**
  carefully analyze the changes leading up to an event. This method is used when there are many potential causes and looking at a longer period to gain a historical context

Root cause analysis - techniques and methods

- **Cause and effect Fishbone diagram or Ishikawa diagram**
  It visually maps cause and effect and helps identify possible causes for a problem by following categorical branched paths to potential causes until finding the right one



Root cause analysis - techniques and methods